

# NASA TECH BRIEF



NASA Tech Briefs are issued to summarize specific innovations derived from the U.S. space program, to encourage their commercial application. Copies are available to the public at 15 cents each from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

## Effects of Surface Preparation on Quality of Aluminum Alloy Weldments

The effects of surface preparation and surface contamination on the welding of 2014 aluminum were investigated. Surfaces prepared using conventional aerospace industry procedures were characterized in terms of weld-defect potential.

Several methods of surface analysis were employed to identify the surface properties conducive to weld defects. These methods are radioactive evaporation (Meseran), spectral reflectance, mass spectrometry, gas chromatography, and spark-emission spectroscopy. "As-machined" surfaces were found to result in defect-free welds. Conventional surface treatments such as solvent degreasing, chemical cleaning, and water rinsing promote the formation of porosity during welding. The porosity-forming agents are adsorbed solvent, hydrogen, and water. Anodizing and silicone coating produce extremely detrimental conditions for welding. These results and testing procedures are considered to be preliminary at this time. Further work is planned to develop and standardize analytical methods and to

measure a greater variety of surface conditions. The ultimate goal will be to select and develop surface preparations that will provide consistently high weld quality.

### Note:

Inquiries concerning this investigation may be directed to:

Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama 35812  
Reference: B68-10302

### Patent status:

No patent action is contemplated by NASA.

Source: D. Kizer and Z. Saperstein  
of IIT Research Institute  
under contract to  
Marshall Space Flight Center  
(MFS-13152)

Category 03



# NASA TECH BRIEF

Abstract: This paper describes a new method for the determination of the relative humidity of a gas mixture. The method is based on the measurement of the change in the refractive index of the gas mixture as a function of the relative humidity. The method is simple and accurate and can be used for the determination of the relative humidity of a gas mixture at any temperature and pressure.

Keywords: Relative humidity; Refractive index; Gas mixture; Determination; Method

The relative humidity of a gas mixture is a measure of the amount of water vapor present in the mixture. It is defined as the ratio of the partial pressure of the water vapor to the saturation vapor pressure of water at the same temperature. The relative humidity is an important parameter in many fields of science and engineering, particularly in the study of the atmosphere and the behavior of materials in humid environments.

There are many methods for the determination of the relative humidity of a gas mixture. Some of the most common methods are the gravimetric method, the psychrometric method, and the chilled mirror method. Each of these methods has its own advantages and disadvantages, and the choice of method depends on the specific requirements of the measurement.

The method described in this paper is a new method for the determination of the relative humidity of a gas mixture. It is based on the measurement of the change in the refractive index of the gas mixture as a function of the relative humidity. The method is simple and accurate and can be used for the determination of the relative humidity of a gas mixture at any temperature and pressure.

The principle of the method is based on the fact that the refractive index of a gas mixture is a function of the relative humidity. As the relative humidity increases, the refractive index of the gas mixture also increases. This relationship can be used to determine the relative humidity of a gas mixture by measuring the change in the refractive index of the gas mixture as a function of the relative humidity.

The method described in this paper is a new method for the determination of the relative humidity of a gas mixture. It is based on the measurement of the change in the refractive index of the gas mixture as a function of the relative humidity. The method is simple and accurate and can be used for the determination of the relative humidity of a gas mixture at any temperature and pressure.